

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Currently amended) A method of using a secondary key to facilitate
2 invalidation of cached data, comprising:
3 at a first data source:
4 associating a URL (Uniform Resource Locator) with a first data
5 object;
6 forwarding the first data object to a cache, along with:
7 a primary key comprising the URL; and
8 a secondary key configured to identify the first data source;
9 caching the first data object at the cache, wherein the cache is configured
10 to cache multiple versions of the first data object, and wherein each version is
11 cached with a different primary key and the same secondary key;
12 issuing an invalidation message from the first data source to the cache,
13 wherein said invalidation message comprises the identifier; and
14 at the cache, using the identifier to identify one or more data objects for
15 invalidation, including the first data object.

- 1 2. (Original) The method of claim 1, wherein:
2 the primary key uniquely identifies the first data object; and
3 the secondary key identifies a set of data objects having the same data
4 source.

1 3. (Original) The method of claim 1, further comprising, at the cache:
2 maintaining a mapping of said secondary key to URLs of the one or more
3 data objects.

1 4. (Original) The method of claim 1, further comprising, at the cache:
2 maintaining a mapping of the URL of the first data object to one or more
3 secondary keys of the first data object, including said secondary key.

1 5. (Original) The method of claim 1, wherein the invalidation message is
2 issued after the source of the one or more data objects changes from the first data
3 source to a second data source.

1 6. (Currently amended) A computer readable medium storing instructions
2 that, when executed by a computer, cause the computer to perform a method of
3 using a secondary key to facilitate invalidation of cached data, wherein the
4 computer-readable medium includes one of a volatile memory, a non-volatile
5 memory, a disk drive, a magnetic tape, a compact disc, a digital versatile disk, and
6 a digital video disk, the method comprising:
7 at a first data source:
8 associating a URL (Uniform Resource Locator) with a first data
9 object;
10 forwarding the first data object to a cache, along with:
11 a primary key comprising the URL; and
12 a secondary key configured to identify the first data source;
13 caching the first data object at the cache, wherein the cache is configured
14 to cache multiple versions of the first data object, and wherein each version is
15 cached with a different primary key and the same secondary key;
16 issuing an invalidation message from the first data source to the cache,

17 wherein said invalidation message comprises the identifier; and
18 at the cache, using the identifier to identify one or more data objects for
19 invalidation, including the first data object.

1 7. (Currently amended) A computer-implemented method of facilitating
2 invalidation of cached data using a secondary key, the method comprising:
3 at an application configured to produce cacheable data objects, associating
4 with a first data object:
5 a first primary key configured to uniquely identify the first data
6 object within a collection of computer systems; and
7 a first secondary key configured to identify multiple data objects
8 having a common attribute;
9 when the first data object is provided to a cache to be cached, providing
10 said first secondary key, wherein the cache is configured to cache multiple
11 versions of the first data object, and wherein each version is cached with a second
12 primary key and the first secondary key; and
13 issuing an invalidation message from the application to the cache to
14 invalidate the multiple data objects, wherein the invalidation message includes
15 said first secondary key.

1 8. (Original) The method of claim 7, wherein the first primary key is
2 identified to the cache by a client when the client desires to receive the first data
3 object.

1 9. (Original) The method of claim 8, wherein the first secondary key is not
2 known to the client.

1 10. (Original) The method of claim 7, wherein said first secondary key

2 comprises an identifier of the application.

1 11. (Original) The method of claim 7, wherein:
2 the common attribute is a data source; and
3 said first secondary key comprises an identifier of a source of the first data
4 object.

1 12. (Original) The method of claim 7, wherein:
2 the common attribute is a template used to produce the multiple data
3 objects; and
4 said first secondary key comprises an identifier of the template.

1 13. (Original) The method of claim 7, further comprising, at the cache:
2 receiving the invalidation message;
3 mapping said first secondary key to primary keys of the multiple data
4 objects; and
5 invalidating the multiple data objects.

1 14. (Original) The method of claim 7, wherein said first secondary key
2 comprises a security symbol.

1 15. (Original) The method of claim 7, wherein said first secondary key
2 comprises a name.

1 16. (Original) The method of claim 7, wherein said first secondary key
2 comprises a date.

1 17. (Original) The method of claim 7, wherein said first secondary key

2 comprises address information.

1 18. (Original) The method of claim 7, wherein said first secondary key
2 comprises a product identifier.

1 19. (Currently amended) A computer readable medium storing instructions
2 that, when executed by a computer, cause the computer to perform a method of
3 facilitating invalidation of cached data using a secondary key, wherein the
4 computer-readable medium includes one of a volatile memory, a non-volatile
5 memory, a disk drive, a magnetic tape, a compact disc, a digital versatile disk, and
6 a digital video disk, the method comprising:

7 at an application configured to produce cacheable data objects, associating
8 with a first data object:

9 a first primary key configured to uniquely identify the first data
10 object within a collection of computer systems; and

11 a first secondary key configured to identify multiple data objects
12 having a common attribute;

13 when the first data object is provided to a cache to be cached, providing
14 said first secondary key, wherein the cache is configured to cache multiple
15 versions of the first data object, and wherein each version is cached with a second
16 primary key and the first secondary key; and

17 issuing an invalidation message from the application to the cache to
18 invalidate the multiple data objects, wherein the invalidation message includes
19 said first secondary key.

1 20. (Currently amended) A computer-implemented method of facilitating
2 invalidation of cached data using a secondary key, the method comprising:

3 receiving at a cache a first data object to be cached, wherein the first data

4 object is accompanied by:
5 a first primary key configured to uniquely identify the first data
6 object within a network; and
7 a first secondary key comprising information common to multiple
8 data objects in the network, including the first data object;
9 wherein the cache is configured to cache multiple versions of the
10 first data object, and wherein each version is cached with a second primary
11 key and the first secondary key;
12 maintaining at the cache a mapping between said first secondary key and
13 primary keys of the multiple data objects; and
14 in response to receipt at the cache of an invalidation message identifying
15 said first secondary key:
16 identifying the primary keys of the multiple data objects; and
17 invalidating the multiple data objects.

1 21. (Original) The method of claim 20, wherein said invalidation message
2 does not specify the primary keys of the multiple data objects.

1 22. (Original) The method of claim 20, wherein requests received at the
2 cache to serve the first data object include the first primary key but not said first
3 secondary key.

1 23. (Original) The method of claim 20, wherein said first secondary key
2 comprises a security symbol.

1 24. (Original) The method of claim 20, wherein said first secondary key
2 comprises a name.

1 25. (Original) The method of claim 20, wherein said first secondary key
2 comprises a date.

1 26. (Original) The method of claim 20, wherein said first secondary key
2 comprises address information.

1 27. (Original) The method of claim 20, wherein said first secondary key
2 comprises a product identifier.

1 28. (Currently amended) A computer readable medium storing instructions
2 that, when executed by a computer, cause the computer to perform a method of
3 facilitating invalidation of cached data using a secondary key, wherein the
4 computer-readable medium includes one of a volatile memory, a non-volatile
5 memory, a disk drive, a magnetic tape, a compact disc, a digital versatile disk, and
6 a digital video disk, the method comprising:

7 receiving at a cache a first data object to be cached, wherein the first data
8 object is accompanied by:

9 a first primary key configured to uniquely identify the first data
10 object within a network; and

11 a first secondary key comprising information common to multiple
12 data objects in the network, including the first data object;

13 wherein the cache is configured to cache multiple versions of the
14 first data object, and wherein each version is cached with a second primary
15 key and the first secondary key

16 maintaining at the cache a mapping between said first secondary key and
17 primary keys of the multiple data objects; and

18 in response to receipt at the cache of an invalidation message identifying
19 said first secondary key:

20 identifying the primary keys of the multiple data objects; and
21 invalidating the multiple data objects.

1 29. (Currently amended) A system for facilitating invalidation of cached
2 data objects, comprising:
3 a first cache configured to cache data objects for serving to clients; and
4 a data source, coupled to the first cache via a network, wherein the data
5 source is configured to:
6 produce data objects for caching in the cache;
7 associate with each data object a primary key configured to
8 uniquely identify the data object within the network;
9 associate with each data object a secondary key, wherein each
10 secondary key is associated with a set of data objects having a common
11 attribute; and
12 issue to the cache an invalidation message comprising a first secondary
13 key to facilitate the invalidation of a first set of data objects;
14 wherein:
15 the first cache is configured to cache multiple versions of a first
16 data object; and
17 each said version is cached with a different primary key and the
18 same secondary key.

1 30. (Original) The system of claim 29, wherein a client is configured to
2 receive the primary key of a data object it desires, but not the secondary key.

1 31 (Canceled).

1 32. (Original) The system of claim 29, further comprising:

- 2 a second cache configured to cache a first data object cached by the first
- 3 cache, with a different primary key and the same secondary key.